



10CFR50.73

June 22, 2007

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Limerick Generating Station, Unit 2
Facility Operating License No. NPF-85
NRC Docket No. 50-353

Subject: LER 2-07-003, Automatic Actuation Of The Reactor
Protection System At Power

This Licensee Event Report (LER) addresses an event that resulted in an automatic actuation of the reactor protection system due to a valid reactor low-level condition. This event was caused by an intermittent failure of a circuit card in the redundant reactivity control system that initiated a feedwater pump speed runback.

Report Number: 2-07-003
Revision: 00
Event Date: April 24, 2007
Discovered Date: April 24, 2007
Report Date: June 22, 2007

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A), 10CFR50.73(a)(2)(v)(D) and 10CFR50.73(a)(2)(i)(B).

There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Original signed by Edward Callan for Chris Mudrick

Christopher H. Mudrick
Vice President - Limerick
Exelon Generation Company, LLC

cc: S. J. Collins, Administrator Region I, USNRC
S. L. Hansell, USNRC Senior Resident Inspector, LGS

LICENSEE EVENT REPORT (LER)(See reverse for required number of
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME

Limerick Generating Station, Unit 2

2. DOCKET NUMBER

05000353

3. PAGE

1 OF 5

4. TITLE

Automatic Actuation of the Reactor Protection System at Power

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED																																		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER																																	
04	24	2007	2007	- 003 -	0	06	22	2007		05000																																	
9. OPERATING MODE 1			11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)																																								
			<table border="0"><tr><td><input type="checkbox"/> 20.2201(b)</td><td><input type="checkbox"/> 20.2203(a)(3)(i)</td><td><input type="checkbox"/> 50.73(a)(2)(i)(C)</td><td><input type="checkbox"/> 50.73(a)(2)(vii)</td></tr><tr><td><input type="checkbox"/> 20.2201(d)</td><td><input type="checkbox"/> 20.2203(a)(3)(ii)</td><td><input type="checkbox"/> 50.73(a)(2)(ii)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(viii)(A)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(1)</td><td><input type="checkbox"/> 20.2203(a)(4)</td><td><input type="checkbox"/> 50.73(a)(2)(ii)(B)</td><td><input type="checkbox"/> 50.73(a)(2)(ix)(B)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(i)</td><td><input type="checkbox"/> 50.36(c)(1)(i)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(iii)</td><td><input type="checkbox"/> 50.73(a)(2)(ix)(A)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(ii)</td><td><input type="checkbox"/> 50.36(c)(1)(ii)(A)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(x)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(iii)</td><td><input type="checkbox"/> 50.36(c)(2)</td><td><input type="checkbox"/> 50.73(a)(2)(v)(A)</td><td><input type="checkbox"/> 73.71(a)(4)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(iv)</td><td><input type="checkbox"/> 50.46(a)(3)(ii)</td><td><input type="checkbox"/> 50.73(a)(2)(v)(B)</td><td><input type="checkbox"/> 73.71(a)(5)</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(v)</td><td><input type="checkbox"/> 50.73(a)(2)(i)(A)</td><td><input type="checkbox"/> 50.73(a)(2)(v)(C)</td><td><input type="checkbox"/> OTHER</td></tr><tr><td><input type="checkbox"/> 20.2203(a)(2)(vi)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)</td><td><input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)</td><td></td></tr></table>								<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(B)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.2203(a)(2)(vi)
<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)																																								
<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)																																								
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(ix)(B)																																								
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)																																								
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)																																								
<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)																																								
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)																																								
<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER																																								
<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)																																									
10. POWER LEVEL 100			Specify in Abstract below or in NRC Form 366A																																								

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME

Robert E. Kreider, Manager- Regulatory Assurance

TELEPHONE NUMBER (Include Area Code)

610-718-3400

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	JC	OB	G080	Y	D	BJ	FIC	B045	Y

14. SUPPLEMENTAL REPORT EXPECTED☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

An invalid feedwater runback demand was initiated due to a failure of a redundant reactivity control system (RRCS) circuit card coincident with surveillance testing on the system. The feedwater runback resulted in an automatic actuation of the reactor protection system due to a valid reactor low-level condition. The high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems initiated and injected on the low level condition and successfully restored reactor level. HPCI and RCIC were placed in manual flow control mode during the level recovery due to flow oscillations caused by incorrect flow controller gain and reset settings. The failed RRCS circuit card was replaced and tested successfully. The HPCI and RCIC flow controller gain and reset settings were adjusted to the required settings to ensure stable automatic flow control.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Limerick Generating Station, Unit 2	05000353	2007	-- 003	-- 00	2 OF 5

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

Unit Conditions Prior to the Event

Unit 2 was in Operational Condition (OPCON) 1 (Power Operation) at approximately 100% power. There were no structures, systems or components out of service that contributed to this event.

Description of the Event

On Tuesday, April 24, 2007, Unit 2 was operating at 100% power with surveillance testing in progress on the reactor pressure high channel of redundant reactivity control system (RRCS) division 1A. At approximately 02:10 hours RRCS initiated a demand for a feedwater runback. Feedwater level control (EIIS:SJ) reduced the three operating reactor feedwater pumps to minimum speed, which terminated feedwater flow to the reactor. The reactor protection system (RPS) (EIIS:JC) automatically actuated when reactor level decreased to the low level setpoint of +12.5 inches. All control rods fully inserted. When reactor level decreased to the low-low level setpoint of -38 inches, the high pressure coolant injection (HPCI) (EIIS:BJ) and reactor core isolation cooling (RCIC) (EIIS:BN) systems initiated and injected to the reactor. Reactor wide range level indication decreased to -88 inches and then increased. HPCI was secured during the level increase. Level continued to increase to +54 inches, which tripped RCIC and the reactor feedwater pumps as designed.

Reactor pressure was approximately 1042 psig prior to the automatic scram, decreased after the scram, and stabilized at approximately 960 psig one minute after scram. No main steam relief valve setpoints were exceeded.

Primary containment isolation signals were automatically initiated at +12.5 inches and -38 inches reactor level. A Group 2 isolation occurred at +12.5 inches but the isolation valves were in the closed position prior to the event. Group 1B, 3, 6A, 6B, 6C, 7B, and 8B isolations were initiated at -38 inches and all affected open isolation valves closed as designed.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Limerick Generating Station, Unit 2	05000353	2007	-- 003	-- 00	3	OF 5

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

The reactor recirculation pump trip (RPT) breakers tripped at -38 inches due to the ATWS-RPT system instrumentation. The RRCS alternate rod insertion (ARI) actuated as expected at -38 inches.

HPCI and RCIC were placed in manual mode while injecting to the reactor due to speed and flow oscillations observed by the Reactor Operator. In addition, the HPCI and RCIC suction automatically transferred from the condensate storage tank (CST) to the suppression pool due to the flow oscillations. HPCI and RCIC were later determined to be inoperable based on the observed oscillations.

The investigation determined that a circuit card in RRCS division 1 channel B spuriously actuated while channel A was in a tripped condition due to the surveillance testing in progress. It was further determined that HPCI and RCIC flow oscillations were due to flow control loop tuning settings that were different than the Unit 1 and initial startup testing control loop settings established in 1989.

Prior to plant restart the affected RRCS circuit card was replaced and tested successfully. In addition the HPCI and RCIC flow controller gain and reset settings were set to be consistent with the Unit 1 settings and testing was successfully performed during plant restart. These settings are also similar to settings that existed on the Unit 2 HPCI and RCIC flow controllers when stable flow was demonstrated during initial startup testing of both systems conducted in 1989, and during Unit 2 plant transients in 1990 and 1994 (RCIC only).

This event resulted in an ECCS discharge into the reactor coolant system as a result of a valid signal, an actuation of RPS when the reactor was critical, and a valid actuation of RPS, ECCS, RCIC and containment isolation valves. The 4-hour ENS notifications required by 10CFR50.72(b)(2)(iv)(A) and 10CFR50.72(b)(2)(iv)(B) and the 8-hour notification required by 10CFR50.72(b)(3)(iv)(A) were performed on Tuesday, April 24, 2007 at 04:04 hours (#43315).

This event resulted in automatic actuations of RPS, ECCS, RCIC, and containment isolation valves. This event also identified a

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Limerick Generating Station, Unit 2	05000353	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	4 OF 5
		2007	-- 003	-- 00	

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

condition that could have prevented the fulfillment of the safety function of HPCI. This event resulted in a condition that was prohibited by the plant's Technical Specifications since HPCI and RCIC were inoperable for periods that exceeded the allowable outage times. Therefore, this LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(iv)(A), 10CFR50.73(a)(2)(v)(D) and 10CFR50.73(a)(2)(i)(B).

Analysis of the Event

There were no actual safety consequences associated with this event. The potential safety consequences of this event were minimal. HPCI and RCIC initially injected at reduced capacity while operating in the automatic flow control mode then operated normally for a period in manual mode and successfully restored reactor level to normal. Both HPCI and RCIC remained capable of attaining rated flow when operated in the manual flow control mode. In addition the feedwater pumps and control rod drive pumps were available for injection in the event HPCI and RCIC failed.

The RRCS feedwater runback feature is designed to lower reactor level during an ATWS event to suppress reactor power. It performs this function by transferring feedwater control to manual and decreasing the three feedpump controller demands to minimum speed. The division 1B high power output optical isolator card failed concurrently with testing on division 1A initiating this event. This failure caused the transmission of an invalid demand for a feedwater runback to the feedwater control system.

HPCI and RCIC utilize Bailey Type 701 analog flow controllers that are tuned during full flow testing with the suction and discharge flow paths aligned to the CST. The controllers were last tested in the injection to the reactor mode during initial startup testing conducted in 1989. Differences in system response during routine testing and injection modes resulted in a failure to identify the pre-existing system flow control instability during injection mode. The Unit 2 HPCI and RCIC flow control gain and reset settings were changed during system tuning in May 1999. Therefore, this

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)	
Limerick Generating Station, Unit 2	05000353	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 OF 5	
		2007	-- 003	-- 00		

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

condition existed on Unit 2 for approximately 8 years; Unit 1 was not affected. The as-left flow control settings are approximately the settings used on Unit 1, which were verified to be stable during HPCI and RCIC injections on April 20, 1999 and April 23, 2003.

Cause of the Event

The scram was caused by an intermittent failure of a circuit card in RRCS division 1B concurrent with ongoing testing on division 1A that caused a reactor feedwater runback.

The flow oscillations on HPCI and RCIC were caused by improper flow control loop setting adjustments of gain and reset.

Corrective Action Completed

The degraded circuit card in RRCS division 1B was replaced.

The Unit 2 flow control loop gain and reset settings for HPCI and RCIC were set to be consistent with the Unit 1 settings.

The procedure for tuning of HPCI and RCIC flow controls was revised to specify the required gain and reset settings.

Previous Similar Occurrences

There were no previous similar occurrences of scrams caused by feedwater runback. There were previous similar occurrences of scrams caused by a loss of feedwater. These events were reported in LERs 1-03-003, 1-99-003, and 2-90-015. There were no previous similar occurrences of flow oscillations during HPCI or RCIC injection.

Component data:

HPCI and RCIC Analog Flow Controllers
Manufacturer: B045 ABB Automation Inc.
Model number: 701003AAAE1

RRCS High Power Output Isolator Circuit Card
Manufacturer: G080 General Electric
Part number: 219B5369G005